What is claimed is:

1. A method of producing particles comprising:
providing a supercritical fluid or compressed gas;
providing a solution comprising one or more solutes dissolved in one or more solvents;
contacting the solution and the supercritical fluid or compressed gas together to form an emulsion, the emulsion having a continuous phase comprising the supercritical fluid or compressed gas and a discontinuous phase comprising the solution;
spraying the emulsion through an orifice across a pressure drop to form spray droplets; and
removing the supercritical fluid or compressed gas and the solvent from the spray droplets to obtain particles comprising the solute.

2. The method according to claim 1 wherein the emulsion is sprayed across a pressure drop sufficient to cause the supercritical fluid or compressed gas to decompress into a gas phase.

3. The method according to claim 2 wherein the emulsion is sprayed into an expansion vessel maintained at a temperature below the freezing point of the solvent in the solution.

4. The method according to claim 3 wherein expansion of the supercritical fluid or compressed gas causes the discontinuous phase of the emulsion in the spray droplets to freeze into frozen particles from which the solvent is removed by lyophilization.

5. The method according to claim 2 wherein the emulsion is sprayed into an expansion vessel maintained at a temperature above the boiling point of the solvent in the solution.

6. The method according to claim 5 wherein the solvent is removed from the spray droplets by evaporation.

7. The method according to claim 1 wherein a surfactant is dissolved in the supercritical fluid or compressed gas prior to contacting the solution.

8. The method according to claim 1 wherein a surfactant is dissolved in the solution prior to contacting the supercritical fluid or compressed gas.

9. The method according to claim 1 wherein the solution and the supercritical fluid or compressed gas are contacted together under high shear mixing conditions to form the emulsion.

10. The method according to claim 1 wherein the particles formed after removal of the solvent have an average particle size of from about 0.1 nanometers to 10 micrometers.

11. The method according to claim 1 wherein the one or more solutes is selected from the group consisting of medicinal agents, biologically active materials, sugars, viral materials, diagnostic aids, nutritional materials, proteins, peptides, animal extracts, plant extracts and combinations thereof.

12. The method according to claim 1 wherein the one or more solutes is selected from the group consisting of agricultural chemicals, dyes, explosives, paints, polymer precursors, alkyloids, alkaloids, cosmetics, insecticides, pigments, toxins, antigens, enzymes, catalysts, nucleic acids, and combinations thereof.

13. The method according to claim 11 wherein the solution further comprises an additional solute that acts as a coating agent selected from the group consisting of polymers, fillers, disintegrants, binders, solubilizers, excipients and combinations thereof.

14. The method according to claim 13 wherein the polymer is selected from the group consisting of polysaccharides, polyesters, polyethers, polyanhydrides, polyglycolides (PLGA), polylactic acids (PLA), polycaprolactones (PCL), polyethylene glycols (PEG), polypeptides and combinations thereof.

15. A method of producing particles comprising:

providing supercritical or compressed carbon dioxide;

providing a solution comprising a biologically active material and a matrix material dissolved in water;

contacting the solution and the supercritical or compressed carbon dioxide together under high shear in the presence of a surfactant to form an emulsion, the emulsion having a continuous phase comprising the supercritical or compressed carbon dioxide and a discontinuous phase comprising the solution;

spraying the emulsion through an orifice to form spray droplets; and

removing the supercritical or compressed carbon dioxide and the solvent from the spray droplets to form discrete particles that comprise both the biologically active material and the matrix material.

16. The method according to claim 15 wherein the emulsion is sprayed across a pressure drop sufficient to cause the supercritical or compressed carbon dioxide to decompress into a gas phase.

17. The method according to claim 16 wherein the emulsion is sprayed into an expansion vessel maintained at a temperature below the freezing point of the solvent in the solution.

18. The method according to claim 17 wherein expansion of the supercritical or compressed carbon dioxide causes the discontinuous phase of the emulsion in the spray droplets to freeze into frozen particles from which the solvent is removed by lyophilization.

19. The method according to claim 16 wherein the emulsion is sprayed into an expansion vessel maintained at a temperature above the boiling point of the solvent in the solution.

20. The method according to claim 19 wherein the solvent is removed from the spray droplets by evaporation.